SECTION 15439 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Piping insulation.
2. Adhesive, tie wires, tapes.

1.3 SUBMITTALS

A. Submit shop drawings and samples in accordance with Section 01340.

B. Submit shop drawings which indicate complete material data, a list of materials proposed for this project and indicate thickness of material for individual services.

C. Submit samples of proposed insulating materials.

1.4 JOB CONDITIONS

A. Deliver material to job site in original non-broken factory packaging, labeled with manufacturer's density and thickness.

B. Perform work at ambient and equipment temperatures as recommended by the adhesive manufacture.

1.5 ALTERNATIVES

A. Alternative insulations are subject to Engineer approval. Alternatives to provide same thermal resistance within 10%, at normal conditions as materials specified.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Insulation: CertainTeed, Armstrong, Manville, and Owens-Corning.

B. Pipe Fitting Covers: Childers, Armstrong, and Zeston.

C. Vapor Barrier Coatings: Benjamin-Foster, Childers, and Insul-Coustics.

D. Items of the same function and performance are acceptable if submitted and approved in conformance with Section 01340.

2.2 GENERAL

A. Adhesives and Insulation Materials: Composite fire and smoke hazard ratings maximum 25 for Flame Spread and 50 for Smoke Developed. Adhesives shall be waterproof.

B. Materials, coatings and accessories listed below are excepted from the fire resistance requirements:

Asphaltic mastic
Nylon anchors
Weatherproof coating.

C. Physical values employed in this section are expressed in the following units:

Quantity	Unit
Density	lb./ft.^{3}
Temperature	°F
Thermal conductance[1] "C" value (1/R)	Btu/hr x ft.^{2} x °F
Thermal conductivity[2], "k" value	Btu x in./hr x ft.^{2} x °F
Thermal resistance, "R" value (1/C)	hr x ft.^{2} x °F/Btu

[1]Conductance is applicable to homogeneous materials.

[2]Conductivity is conductance of homogeneous material of unit thickness (inches in conventional units).

D. Except as otherwise noted, insulation shall have white jackets and adhesive shall be white or clear.

E. Insulation on strainers and other fittings, accessories, and equipment requiring servicing or inspection shall have insulated sheet metal or PVC covers packed with insulation, which shall be removable and replaceable without damaging insulation or vapor barrier.

F. Insulation and jacket shall be types listed below. Thermal conductivity ("k" factors) listed are maximum acceptable. Except as otherwise indicated, conductivity shall be measured at

mean temperature = 100. Conductivity of proprietary insulation, where not listed herein, shall be as standard with manufacturer for listed product.

1. Type GF - Factory-molded glass fiber, nominal density equal to 5 k less than 0.24 at a mean temperature of 75, with all-service, vapor proof jacket and self-sealing lap, equal to Owens-Corning "Fiberglass 25 ASJ/SSL." Fittings and valves shall be insulated with pre-molded PVC covers, equal to Zeston, with glass fiber inserts, with edges vapor sealed with tape.

G. Accessories shall conform to the following, except where other specific product is specified.

1. Adhesives

   a. Contact adhesive shall conform to Mil. Spec. MIL-A-24179, Type II, Class I.

2. Bands

   a. Insulation bands shall be galvanized steel, 3/4 x 0.015 in.

3. Glass tape shall conform to Mil. Spec. MIL-C-20079, Type II, Class 1.

4. Glass cloth shall conform to Mil. Spec. MIL-C-20079, Type I, Class 1, untreated.

5. Jacket, non-metallic

   a. Jacket shall not support mold growth.

   b. Pipe and equipment vapor barrier jacket shall conform to Fed. Spec. HH-B-100, Type I.

   c. Jacket on insulation exposed in finished areas shall have white finish suitable for painting without sizing.

   d. Presized glass cloth jacket shall be mildew-proof, with integral vapor barrier with perm rating equal to or smaller than that required for applicable service, and with following properties:

Property	ASTM Test	Units	Value
Bursting strength	D 774	$lb./in.^2$	>200
Puncture resistance	D 781	Beach	>100
Weight	-	$oz./yd.^2$	7.8

6. PVC fitting covers shall conform to Fed. Spec. L-P-535, Composition A. Type II.

7. Staples shall be outward-clinching type, conforming to ASTM A 167, Type 304 or 316 stainless steel.

8. Vapor barrier coating shall conform to Mil. Spec. MIL-C-19565, Type II, white.

9. Vapor barrier shall be Zeston 10 mil (250 mm) thick polyvinyl chloride (PVC), with Zeston joint sealing materials and 3 in. (75 mm) wide PVC collars at joints.

    a. Vapor barrier coating for fittings shall be Insul-Coustic, IC570.

PART 3 -EXECUTION

3.1 INSTALLATION

A. General

1. In systems which are required to be insulated, pipe, valves, flanges, and other fittings (all of which will be referred to collectively herein as "fittings") shall be insulated.

2. Piping and equipment shall be insulated only after each item has been tested and approved for tightness.

B. Application Conditions

1. Surfaces shall be dry and free from dust, grease, and other foreign matter when insulation is applied.

2. Insulation shall be dry when applied, and shall be maintained dry until Developer's acceptance of work.

C. Workmanship

1. Insulation edges shall be neatly butted to form tight, hairline joints.

    a. Rigid insulation on curved surface shall be beveled to form tight joints.

2. Where indicated insulation thickness exceeds manufacturer's standard thickness, insulation shall be applied in 2 layers, with joints staggered.

D. Pipes penetrating through insulated building element (ceiling, floor, wall, etc.) shall be wrapped with resilient glass fiber insulation. Insulation may be in preformed form to fit item to be insulated, or may be in sheet form, field fitted to item. Insulation shall form tight fit with penetrating item.

1. Insulation thickness between penetrating item and building element and its insulation shall be at least 1 inch.

2. Penetration of element which has vapor barrier shall include vapor seal from element vapor barrier to penetrating item. Vapor seal shall be on warm side of room insulation.

3. Where projection of penetrating item from warm side of room insulation is less than 3 inches room insulation and vapor barrier shall completely enclose item.

E. Insulation on piping passing through sleeves or other openings shall be continuous through sleeve or opening, with no reduction in thickness.

F. Install insulation on the following:

1. All cold water piping.

2. Hot water mains and take-offs to within walls or pipe chases.

3.2 PIPE INSULATION

A. Cold water piping shall have a vapor barrier.

B. Fittings, Flanges, and Valves:

1. Valves in the following systems shall be covered to the underside of the stuffing box gland:

Cold water
Hot water

C. Insulation Shield

1. Insulation at pipe support points and between insulation shield and pipe shall be molded calcium silicate, Type CS. Insulation shall be same thickness as adjacent insulation beyond insert when system is fully loaded. Inserts shall extend over 180° arc, centered on pipe, with length as long as the protection shield or at least 12 inches, whichever is greatest.

2. Insulation insert shall be covered with jacket of same kind as on adjacent pipe insulation. Jacket shall lap pipe insulation jacket 1-1/2 inches, and lap shall be cemented with adhesive and stapled. On cold pipe lap shall also be sealed with brush coat of vapor barrier coating.

3. Where specified hanger or support does not include metal insulation shield, such a shield shall be provided under this section and shall be employed between insulation and support.

4. Pipe 3 and 22 inches in diameter may be supported with a shield at least 24 inches long without insert with Type GF insulation. Pipe less than 22 inches in diameter may be supported with a shield 12 inches long without insert with Type GF insulation.

3.3 JACKETS

A. Insulation jackets shall be tight, free from fishmouths. Exposed duct insulation shall be free from wrinkles.

B. Longitudinal overlaps in exposed work shall face towards ceiling or wall, whichever is closest. Overlaps shall be at least 1-1/2 inch wide.

C. Where not otherwise specified, insulation on hot equipment shall be furnished with two coats of adhesive with glass cloth embedded between coats. Cloth shall be lapped 2 inches at joints. Adhesive total dry film thickness shall be at least 1/16 inch.

D. Pipe insulation in location exposed to view shall be covered with factory applied pre-sized glass cloth jacket or factory-applied vapor barrier jacket.

E. Pipe insulation in concealed locations shall be covered with jackets as specified for exposed pipe, which may be factory- or field-applied.

F. Longitudinal laps in jacket shall overlap 2 inches for pipe insulation. Butt joints shall be wrapped with 3 inch wide strip of jacket material. Laps shall be cemented with adhesive and additionally secured with staples at 4 inches on center. Adhesive may be omitted in concealed areas.

G. Fittings

1. Couplings, anchors, and other fittings shall be installed with factory-premolded sections of insulation of the same material and thickness as the adjoining pipe insulation.

2. PVC fitting covers shall be secured by blanket inserts, provided with the covers.

3.4 VAPOR BARRIER

A. Vapor barrier shall be continuous, and shall be fully vapor sealed at insulation termination.

B. Vapor barrier coating finish shall be applied in 2 coats, with glass cloth embedded between coats. Glass cloth overlap at joints shall be at least 2 inches. Dry thickness of each vapor barrier coating shall be at least 1/16 inch. Lap of coating over adjacent insulation jacket or uninsulated surface, penetrating item, etc., shall be at least 2 inches.

C. At penetrations of vapor barrier coating, insulation voids shall be filled with coating material and penetration sealed with brush coat of same material and thickness.

D. Field-applied vapor barrier jacket shall be fastened to insulation with adhesive, applied to entire surface.

E. Breaks in vapor barrier jacket shall be repaired by replacing damaged portion of insulation and sealing vapor barrier as specified above, or jacket shall be patched with vapor barrier

material, covering damaged portion and lapping at least 1-1/2 inches over undamaged area beyond. Edges of patch shall be stapled at 4 inches on center and sealed with brush coat of vapor barrier coating.

F. PVC vapor barrier shall be factory applied to straight runs of insulation, where practicable. Butt joint shall be covered with PVC collar to completely vapor seal joint.

1. Insulation on fitting shall be coated with vapor barrier coating.

3.5 INSTALLATION OF SPECIFIC TYPES

A. Type GF - Insulation for fittings, valves, strainers, and flanges shall be mitered or premolded, made smooth with insulation cement, and finished with field-applied 3 ply vapor barrier. End joints shall be butted, sealed with vapor barrier cement, and finished with a 4 inch wide strip of 3 ply vapor barrier. Longitudinal joints shall be sealed with an approved vapor barrier cement. Staples employed to aid fastening shall be brushed over with vapor barrier lap cement.

3.6 SCHEDULE

A. Insulation thicknesses and types for major plumbing items and systems are listed in the following schedules. Insulation on accessory items not listed in these schedules shall be as specified for major items in the system of which the accessory forms a part.

Service	Pipe Sizes (Inches)	Insulation Thickness Inches	Type
Cold Water Mains and Branches	All	1	GF
Hot Water Mains and Branches	All	1	GF

END OF SECTION 15439